

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 1515SG112SC	<div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> FOR FURTHER ACTION </div> <div> see Form PCT/ISA/220 as well as, where applicable, item 5 below. </div> </div>	
International application No. PCT/SG2004/000093	International filing date (<i>day/month/year</i>) 14 April 2004	(Earliest) Priority Date (<i>day/month/year</i>) 14 April 2003
Applicant TEMASEK LIFE SCIENCES LABORATORY et al		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of **5** sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☒ **Certain claims were found unsearchable** (See Box No. II).

3. ☐ **Unity of invention is lacking** (See Box No. III).

4. With regard to the **title**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

**DETECTION OF A TARGET NUCLEIC ACID, BY POLYMERASE REACTION AND ENZYMATIC
DETECTION OF RELEASED PYROPHOSPHATE.**

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

- b. ☒ none of the figures is to be published with the abstract.

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: **20 - 22 (partially)**
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
The claimed kits have been searched only to the extent that they are being used in the method of the invention.

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SG2004/000093

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. ⁷: C12Q 1/68, 1/66

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

AS BELOW

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

AS BELOW

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPIDS, CAPLUS, MEDLINE ; Keywords ; pyrophosphate, nucleic, DNA, polymerase, detect, luciferase.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO, A, 1998/013523, (PYROSEQUENCING AB) 2 April 1998. (See particularly p. 3 line 7 - p. 6, line 20 and claims 1, 10)	1 - 22
X	WO, A, 1998/028440, (PYROSEQUENCING AB) 2 July 1998 (See particularly p. 3 line 5 - p. 6, line 12 and claims 1, 16 and 17)	1 - 22
X	US, A, 4971903, (EDWARD HYMAN) 20 November 1990 (see particularly the Example and claims 1 - 4)	1 - 22
X	EP, A, 630974 (EASTMAN KODAK COMPANY) 28 December 1994 (see particularly Example and claims 1 - 10)	1 - 22



Further documents are listed in the continuation of Box C



See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

24 May 2004

Date of mailing of the international search report

- 3 JUN 2004

Name and mailing address of the ISA/AU

AUSTRALIAN PATENT OFFICE
 PO BOX 200, WODEN ACT 2606, AUSTRALIA
 E-mail address: pct@ipaustalia.gov.au
 Facsimile No. (02) 6285 3929

Authorized officer

ALISTAIR BESTOW

Telephone No : (02) 6283 2450

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO, A2, 2002/064830 (CAMBRIDGE UNIVERSITY TECHNICAL SERVICES) 22 August 2002. (see particularly Example 2 and claims 1 - 17)	1 - 22
X	WO, A, 2000/040750 (AMERSHAM PHARMACIA BIOTECH AB) 13 July 2000, (see particularly p. 2 line 32 - p. 4 line 2, Example 1 and claims 1 - 7)	1 - 22
X	WO, A, 1998/055653 (NEXSTAR PHARMACEUTICALS, INC.) 10 December 1998. (see particularly p. 7 line 14 - p. 9 line 24, Examples and claims 1, 23 - 25, 34 - 39)	1 - 22
X	WO, A, 1992/016654 (UNIVERSITE DE REIMS CHAMPAGNE-ARDENNE) 1 October 1992 (see examples and claims)	1 - 22
P,X	US, A1 2003/0082583 (ARJANG HASSIBI ET. AL.) 1 May 2003. (see particularly claims 1 - 35)	1 - 19
X	RONAGHI, M., et. al. 'Real-Time DNA Sequencing Using Detection of Pyrophosphate Release' Analytical Biochemistry (1996) 242:84-9 (see particularly Abstract and Figure 1)	1 - 22
X	NYRÉN, P., et. al. 'Solid Phase DNA Minisequencing by an Enzymatic Luminometric Inorganic Pyrophosphate Detection Assay' Analytical Biochemistry (1993) 208:171-5. (See particularly Abstract and Figure 1)	1 - 22
X	ALDERBORN, A., et. al. 'Determination of Single-Nucleotide Polymorphisms by Real-time Pyrophosphate DNA Sequencing' Genome Research (2000) 10:1249-58 (see particularly Methods)	1 - 22
X	RONAGHI, m., et. al. 'A Sequencing Method Based on Real-Time Pyrophosphate' Science (1998) 281:363-5 (see particularly Fig. 1)	1 - 22
X	IMAMURA, O. et. al. 'Simple and Rapid Bioluminescent Detection for Allele Specific PCR of <i>E. COLI</i> O 157:H7' Bioluminescence & Chemiluminescence: Progress & Current Applications, [Proceedings of the Symposium on Bioluminescence and Chemiluminescence], 12th, Cambridge, United Kingdom, Apr. 5-9, 2002 (2002), 395-398.	1 - 22
X	NYRÉN, P., et. al. 'Detection of Single-Base Changes Using a Bioluminometric Primer Extension Assay' Analytical Biochemistry (1997) 244:367-73. (see particularly Abstract and Fig. 1)	1 - 22
X	NYGREN, M., et. al. 'Quantification of HIV-1 Using Multiple Quantitative Polymerase Chain Reaction Standards and Bioluminometric Detection' Analytical Biochemistry (2001) 288:28-38. (see particularly	1 - 22

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/SG2004/000093

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
WO	9813523	AU	43918/97	EP	0932700	US	6210891
WO	9828440	AU	53311/98	EP	0946752	US	6258568
		US	2003104372	WO	02068684		
US	4971903	AU	33548/89	WO	8909283		
EP	0630974	JP	7059600				
WO	02064830	CA	2440698	EP	1360330		
WO	0040750	AU	19838/00	AU	35370/01	AU	44105/01
		CA	2357775	CA	2395159	EP	1141401
		EP	1239962	EP	1242186	US	2003143114
		US	2003146155	WO	0146465	WO	0147638
WO	9855653	AU	78136/98				
WO	9216654	AU	16460/92	FR	2674254		
US	2003082583	EP	1415004	WO	03087388		
Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.							
END OF ANNEX							